Clinical Anatomy of the Thyroid and Adrenal Glands

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Lawrence M. Witmer, PhD
Professor of Anatomy
Department of Biomedical Sciences
College of Osteopathic Medicine
Ohio University
Athens, Ohio 45701
witmerL@ohio.edu
Anatomical Overview

- Right & left lobes connected by an isthmus
- Occasional pyramidal lobe
- Levator glandulae thyroideae
- Slightly larger in women; may enlarge during menstruation & pregnancy
- Extends from oblique line on thyroid cartilage down to 4th or 5th tracheal ring
- Attaches to cricoid cartilage via suspensory ligament

From Netter’s Atlas
Case Presentation

A 32-year-old woman presents with a swelling on the anterior part of her neck. She also reports that her breathing is sometimes affected by the swelling. On examination, a single, firm, rounded mass can be felt on the left side of the laryngotracheal region. It moves up and down with swallowing. Ultrasound reveals a solid nodule in the left lobe of her thyroid gland. A needle biopsy subsequently indicates that malignant changes have taken place in the cells.

Preliminary Diagnosis:

Tumor of the left lobe of the thyroid
Questions

1. Why does the mass move up and down on swallowing?

2. What can explain the difficulty breathing?

3. What structures would be endangered by subtotal or total thyroidectomy?

4. Why is the nature of the patient’s voice of interest postoperatively?
**Superficial Fascia**

- Skin
- Fat
- Platysma
- Veins (ant. & ext. jug.) and cutaneous nn.

**Deep Fascia** (investing layer)

- Platysma

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Skandalakis’ Surgical Anatomy 2004

Moore & Dalley 2006
Fascia & Spaces

Deep Fascia

1. investing fascia  
2. pretracheal fascia
3. prevertebral fascia  
4. carotid sheath

sternocleido-mastoid

Moore & Dalley 2006
Fascia & Spaces

Deep Fascia

1. investing fascia
2. pretracheal fascia
   a. muscular layer
   b. visceral layer
3. prevertebral fascia
4. carotid sheath

thyroid gland
trachea & larynx
esophagus

Moore & Dalley 2006
**Fascia & Spaces**

pretracheal fascia

thyroid gland

trachea & larynx

esophagus

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**suspenory ligament of Berry**

visceral layer of pretracheal fascia (false capsule)

true capsule

thyroid gland

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Skandalakis’ Surgical Anatomy 2004
1. investing fascia
2. pretracheal fascia
3. prevertebral fascia
4. carotid sheath

- common carotid a. (and sympathetic plexus)
- internal jugular v.
- vagus n. (and carotid sinus n.)
- deep cervical lymph nodes
not discussed today:
• suprasternal space of Burns
• “Danger space” of Grodinsky & Holyoke
Attachment of sternothyroid to oblique line on thyroid cartilage prevents superior expansion of thyroid
Questions

1. Why does the mass move up and down on swallowing?

2. **What can explain the difficulty breathing?**

3. What structures would be endangered by subtotal or total thyroidectomy?

4. Why is the nature of the patient’s voice of interest postoperatively?
Compression and displacement of trachea by thyroid tumor

From Ellis et al. 1991

From web reference 1
Questions

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Posterior View

Vascular Supply & Relations

- superior thyroid a.
- external laryngeal n.
- inferior constrictor m.
- inferior thyroid a.
- recurrent laryngeal n.
- parathyroids
- thyroid
- common carotid a.
- esophagus
- recurrent laryngeal n.

From Netter’s Atlas
Questions

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Skandalakis' Surgical Anatomy 2004

Recurrent Laryngeal N. & Suspensory Lig. of Berry

variation in recurrent laryngeal nerve position (n = 204)

- 4% intrathyroid
- 42% paratracheal
- 48% tracheoesoph. groove
- 6% paraesophageal

Skandalakis’ Surgical Anatomy 2004
Recurrent Laryngeal N. & Suspensory Lig. of Berry

Variation in relationship of recurrent laryngeal n. to inferior thyroid a.

(from Hollinshead 1968)
Recurrent Laryngeal N. & Suspensory Lig. of Berry

Variation in relationship of recurrent laryngeal n. to suspensory lig.

- superior thyroid a. & v. (cut)
- inferior thyroid a. & branches
- recurrent laryngeal n.
- parathyroids

From Netter’s Atlas

(from Hollinshead 1968)
Recurrent Laryngeal N. & Suspensory Lig. of Berry

Variation in relationship of recurrent laryngeal n. to suspensory lig.

From Sasou et al. 1998

(from Hollinshead 1968)
Case Presentation

A 43-year-old male presents with a swelling in the front of his neck. He first noticed it 9 months ago and it has steadily grown. The lump lays near the midline and moves on swallowing. On palpation, it is firm and lays anterior to the thyroid cartilage. The mass is smooth, non-pulsatile, and non-fluctuant. The dorsum of the tongue was inspected but no thyroid tissue was observed. Ultrasound showed the mass to be cystic and separate from the thyroid gland.

Preliminary Diagnosis:
Thyroglossal Cyst

From Moore & Persaud 2003
Questions

1. What is the embryonic derivation of a thyroglossal cyst?

2. Why did the mass move upwards on swallowing?

3. Why did the surgeon look for thyroid tissue on the tongue?
Questions

1. What is the embryonic derivation of a thyroglossal cyst?

2. Why did the mass move upwards on swallowing?

3. Why did the surgeon look for thyroid tissue on the tongue?
Thyroid Development

From Moore & Persaud 2003
Questions

1. What is the embryonic derivation of a thyroglossal cyst?

2. Why did the mass move upwards on swallowing?

3. Why did the surgeon look for thyroid tissue on the tongue?
Ectopic Thyroid Tissue

- lingual thyroid
- accessory thyroid tissue
- cervical thyroid
- foramen cecum
- tongue
- hyoid bone
- thyroglossal duct
- pyramidal lobe
- thyroid cartilage
- thyroid gland

Moore & Dalley 2006
Possible Locations of Thyroglossal Duct Cysts

From Moore & Persaud 2003
Adrenal Overview

- Spinal cord
- Sympathetic trunk
- Splanchnic nerves
- Preganglionic fibers to chromaffin cells in medulla
- Preaortic ganglia (celiac, aorticorenal)

Adrenal Overview

- Adrenal cortex — corticosteroids, androgens
- Adrenal medulla — catecholamines (esp. epinephrine)

From Netter’s Atlas

From Gray’s Atlas
Vascular Supply & Relations

- Superior adrenal arteries (from inferior phrenic a.)
- Middle adrenal arteries (from aorta)
- Inferior adrenal arteries (from renal a.)
- Inferior phrenic artery (with v.)
- Adrenal vein
- IVC (cut)
- Left renal vein

From Netter’s Atlas
Perirenal fascia of Gerota

- pararenal fat
- adrenal gland
- transversalis fascia (ant. layer of Gerota’s f.)
- Toldt’s fascia
- peritoneum
- psoas fascia
- Zuckerkandl’s fascia (post. layer of Gerota’s f.)

From Netter’s Atlas
Imaging

Adrenal tumor

From Ellis et al. 1991

From web reference 3
References

Print

Web
1. Thyroid tumor: http://www.auntminnie.com/ScottWilliamsMD2/nucmed/Tumor/Thallium/Thallium.htm